

Tanks, Battleships, And the Future of Armored Warfare

by Nader Elhefnawy

In 1950, Basil Liddell Hart observed that the conflicting imperatives of increasing a tank's mobility, protection, and firepower were bound to create "an increasingly clumsy monster." His prediction appears to have been accurate. The cycle of heavier guns, thicker armor, and bigger engines, which for so long propelled the development of the tank, enters its last phases.

A similar cycle, the life story of the battleship, completed itself more than a half century ago. This article contends that the evolution of the warship holds important clues to the long-term future of the "landship," as conceived by tank theorists such as J.F.C. Fuller. This change points in the direction of a "net-centric," missile-firing tank — a point well worth discussing given the Army's plans to field a net-centric future combat system (FCS).

Rocket-Firing Tanks

Hart suggested a lighter, smaller, and less-expensive rocket-firing tank. Since then, tanks have become bigger, heavier, and more expensive. However, the warship developed much like Hart described, ceasing to rely on armor for protection and relying primarily on missiles for armament. Additionally, smaller vessels built around new armament, such as missile boats, have proliferated.

While this was a logical direction, mounting fewer and smaller guns in favor of missiles entailed a trade-off. The shell packed a greater punch than any conventionally armed missile. Shells are also cheaper, which is why cannons are used for fire support. Nevertheless, the advent of more powerful explosives and inexpensive missiles — due to increasing research and wider production — may change that. Another contribution was miniaturizing missiles and their launchers to allow more rounds to be carried.

Even without such developments, the missile's longer range and greater in-

telligence has long accounted for more than the shell's advantages in naval conflict, despite the use of smart shells to extend the effective range of guns. The rate of missile fire is limited less by the number of gun tubes than the capacity of its fire control system, so that a missile-firing combat system could simultaneously lock on to and destroy several tanks before a battle tank like the Abrams destroyed even one tank. Warships, of course, still carry guns, because they are inexpensive and useful for self-defense at close range, secondary targets, and fire support. Consequently, even if the tank gun has a future, the tank's future depends on its ability to incorporate the missile into its armament, and to defeat it. The net-centric tank appears to be crucial to that capability.

Net-Centric Armored Warfare

Hart also advocated developing a remote-controlled tank for achieving a breakthrough, but technological developments that he did not anticipate allow future armor to go even further. Information technology has made it unnecessary for firepower, sensors, and controls to be united in a single, discrete package. Such thinking has made the U.S. Navy increasingly net-centric by tying ships, aircraft, and even submarines more closely together; this is also the premise underlying the net-centric tank.

A dispersed tank is not a singular unit, but several smaller units — a system of

systems. The present requirement for the FCS is that no unit can be larger than 20 tons, in the interest of mobility. However, they may be much smaller because each unit only has to be big enough to perform its specialized function.

The dispersal of sensors and weapons among different vehicles would extend striking-power range and help eliminate blind spots, allowing more options in target designation, or massing fire without necessarily massing forces. As formidable as a barrage of missiles fired from a single tank may be, several salvos of missiles launched at once from several different fire vehicles would be all the more overpowering. The potential that such a system has for modularity will make it easy to configure for different types of terrain and for particular missions. Assuming that an all-purpose missile system is not developed, a wide variety of missile launchers could be attached to the unit as needed.

Taking such an approach, even the smallest tank units could have their own, independent surface-to-air missile and even artillery capability, dramatically increasing their independence and offensive power. Warships do not rely on airpower as an independent, separate component launched from a distant base for support. Instead, airpower is an integral part of the unit, so warships may have their own drone carriers. The net-centric tank's ability to disperse would go a long way in creating a tank suited to an urban environment where the ter-



rain is highly fragmented, isolation is all the more dangerous, the capacity to interface with infantry and strike targets outside the line of sight is crucial, and compactness is imperative.

Where the battleship relied on the thickness of armor to protect it, today's warships take a more active approach, relying instead on their ability to confuse and destroy missiles that threaten their existence. Stealthy features, such as lower silhouettes, surfaces that reflect and absorb radar, and electronic warfare capabilities, are being incorporated into warship designs. Antimissile defenses have found their ultimate expression in the outer air battle strategy, which interposes rings of fighter aircraft and surface-to-air missiles between a massed missile attack and the aircraft carrier at the center of a battle group. It has been suggested that future battle groups will use directed-energy weapons, such as microwaves, particle beams, or laser beams, to perform this function, enabling the ships to best position themselves to launch their missiles.

The future tank may go a similar route, relying on evading, rather than absorbing, blows. In the case of a dispersed tank, an enemy would have to hit several small targets designed to have the smallest possible radar and infrared signatures and a better capability to exploit natural cover than a single large vehicle. They may increasingly rely on jamming sensors and launching decoys which mimic tank signatures in the event of an attack, though dummy vehicles may also be included in formations. Assuming that the multiplicity of sensors and weapons launchers would create redundancy, making the system survivable, especially given the high rate of attrition warfare where both sides are capable of fighting an information-based war. Though it is inconceivable that the manned vehicles will be unprotected, the protection afforded by armor may be increased by improvements in materials rather than by the bulk or weight of armor.

Like the carrier groups of the future, a net-centric tank may eventually include a directed-energy weapon for countering air and missile threats, and even artillery-fired submunitions. While a laser weapon, for instance, can be used against ground targets, its inherent inefficiency and high power consumption would mean that the tank's more tradi-

tional weapons would deliver a heavier blow. It may also be better to conserve the laser's punch for self-defense, at least in high-threat environments. In short, laser weapons would function as the shield, missiles as the arrow.

Separated into units, such tanks would be swifter on the ground and able to use bridges that could not bear the weight of heavier tanks. They would also be easier to transport by air because they take up less space in the holds of aircraft, and at least some of these components can be airdropped or moved by helicopter. Fewer combatants would be on the firing line because of automation.

The logistics imposed by this large number of vehicles may be less than they appear. Developments like condition-based maintenance will simplify the task, and a net-centric approach offers certain advantages over old-fashioned armor. It would be easier to replace individual elements of the net-centric tank than to pull a battle tank out of action for repairs. Smaller vehicles, and reducing or even eliminating armor, would allow greater leeway to experiment with new types of power sources, which would ease the logistics strain that modern tanks impose on armies, and revolutionize logistics as well as precision.

Beyond the Dispersed Tank

For all its advantages, a dispersed tank will lack some of the assets of older-style tanks, just as guided-missile destroyers lack some of the battleship's strengths. The dispersed tank will lack the shock effect of a 70-ton Abrams. It may be more vulnerable to electronic warfare because it relies on electronic links, which may even make older-style, unitary tanks more practical under certain conditions.

Moreover, it should not be assumed that the net-centric tank is the final word in armored warfare, any more than today's guided-missile destroyers are the final word in naval warfare. The actual practice of net-centric armored warfare will undoubtedly raise problems that have not been considered. For instance, deploying directed-energy weapons capable of neutralizing attacking missiles and shells may bring about a stalemate on the battlefield. Armored vehicles capable of flight and aircraft capable of ground combat cannot be en-

tirely ruled out. Creating a laser weapon that is compact, powerful, and efficient enough to be a tank's primary weapon will require yet another rethinking of the tank, and perhaps the missile. The same applies to the advent of infantry equipped with armored exoskeletons and much-enhanced weapons, since these may themselves become the new tanks.

Even if these predictions prove inaccurate, the reality is that the rate of technological advance and political change often outrun the speed at which major new weapons systems can be acquired and absorbed. The end of the Cold War deprived a great many weapons systems of their original mission, while the war on terror has made apparent a greater need for systems suited to missions such as homeland defense. Consequently, while one of the inherent strengths of a dispersed, modular tank is its mutability, even the dispersed tank has limitations which will eventually be superseded.

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